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Examiner: Eric L. Bolda

IN THE DRAWINGS

Figs. 1-3 are objected to as requiring a "PRIOR ART" label as only that which is old is illustrated. Corrected drawing sheets 1/8, 2/8, and 3/8 in compliance with 37 CFR 1.121(d) are filed herewith, obviating this rejection.

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REMARKS

Claims 1-11 are pending herein; claim 5 being the only independent claim. Claims 1-4, and 8-11 have been withdrawn due to a restriction requirement by the Examiner, and therefore, claims 5-7 are subject to examination.

Claim 5 has been amended to recite that the *fine drivers are configured to control respective distances between the reflectors and phase conjugate mirrors*. Accordingly, Applicants believe that the manner in which the fine drivers are configured in claim 5 now serves as structure that patentably distinguishes over the cited references.

Drawings

Figs. 1-3 are objected to as requiring a "PRIOR ART" label as only that which is old is illustrated. Amended Figures 1-3 that include a "PRIOR ART" label are filed herewith, obviating this rejection.

Abstract

The abstract is objected to because it has not been submitted by itself (only the cover page of the foreign priority application was submitted). The Abstract is amended to correct grammatical and typographical errors and to remove all reference numbers, and is submitted by itself herein, obviating this rejection.

Claim Objections

The claims are objected to as they include reference numbers that are not enclosed within parentheses. The reference numbers have been deleted from the claims, obviating this rejection.

Rejection under 35 U.S.C. 103(a)

Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kong (US 5,832,020 "Kong") in view of Schlossberg (US 3,842,367 "Schlossberg"). This rejection is respectfully traversed for at least the following reasons.

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The present invention relates to an amplifier that employs a Stimulated Brillouin Scattering - Phase Conjugate Mirror (SBS-PCM) in order to control the random phase of an SBS wave. This result is achieved in the apparatus of claim 5 by reciting, inter alia, *fine drivers for finely driving the reflectors, respectively, and the fine drivers are configured to control respective distances between the reflectors and phase conjugate mirrors so as to control positions at which stimulated Brillouin scattering occurs in the phase conjugate mirrors, thereby making a phase difference between laser beams reflected by the scattering "0"*. In some embodiments, such as set forth in dependent claim 7, the fine drivers employ piezoelectric elements.

Dependent claim 6 sets forth a SBS-PCM that employs a focusing lens that is placed before the mirror. Dependent claim 7 sets forth an SBS-PCM that employs reflectors using concave lenses.

Phase locking is achieved by the apparatus set forth in claim 5 using a reflector such as a concave mirror that operates in accordance with the following principles. The leading part of the incident laser pulse is reflected by the reflector, which is positioned behind the phase conjugate mirror. The leading part of the reflected pulse and the remaining part of the pulse progress in the opposite direction, and thus generate a standing wave at the focal point in the phase conjugate mirror. This standing wave gives rise to a periodic density modulation inside the phase conjugate mirror by the electrostriction effect and the density modulation is spatially fixed, similar to the standing wave. As a result a traveling acoustic phonon is created. Because the point at which the traveling acoustic phonon is generated is determined by the density modulation, the phase of the acoustic phonon is locked. However SBS (Stimulated Brillouin Scattering) occurs through the interaction of an incident wave, the acoustic phonon and the SBS wave, the phases of which are strongly mutually correlated. Therefore if the phase of the acoustic phonon is locked, the phase of SBS wave is itself locked. In this way the phase of the SBS reflected wave is completely locked without performing any additional steps and the phase difference of the beams reflected from each of SBS-PCMs is also locked to a constant value.

Kong (US 5,832,020) shows an optical amplifier using a SBS-PCM without any phase control.

In Schlossberg (US 3,842,367) the piezoelectric adjuster primarily serves to stabilize the frequency of the gas laser beam by adjusting the length of the resonator. In contrast, in the present invention, the phase locking of SBS wave is possible without the use of a piezoelectric adjuster. Accordingly, in the present invention, the self-phase locking of the SBS reflected wave is achieved without performing any additional steps and the phase difference of the beams reflected from each SBS-PCM is also locked to a constant value (i.e., $\Delta\phi$=constant). The fine driver simply performs the secondary function of ensuring that the locked constant phase difference has a value of "0" (i.e., $\Delta\phi$=0). Accordingly, for this reason, Schlossberg does not show a fine driver that is configured in the manner set forth in claim 5.

CONCLUSION

Applicants respectfully submit that all pending claims are in condition for allowance, early notification of which is earnestly solicited. Should the Examiner be of the view that an interview would expedite the application at large, request is made that the Examiner telephone the undersigned attorney at (908) 518-7700 in order to resolve any outstanding issues.

FEES

The Office is authorized to charge any fees required, to deposit account number 50-1047.

Respectfully submitted,

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